1998-2005 ACCESSORIES & BODY CAB

Throttle Control, Speed Control Systems - 163 Chassis

BASIC KNOWLEDGE

ELECTRONIC ACCELERATOR, LOCATION/DESIGN/FUNCTION - GF30.20-P-3010E

ENGINE 104.941 /943 /944 /991 /994 as of 1/8/96

ENGINE 104.995

with CODE (494a) USA version

with CODE (807) Model year 1997

with CODE (808) Model year 1998

with CODE (498) as of Model year 97 Japanese version

ENGINE 111.943 /947 /951 /952 /955 /956 /957 /958 /973 /982 /983,

111.944/975 as of 1.8.96,

111.946 as of 1.6.98,

111.921/942 as of 1.9.98

ENGINE 111.945

in MODEL 208.335 /435 as of 1.6.98,

202.020/080 as of 1.9.98

ENGINE 111.974

with CODE (494a) USA version

with CODE (807) Model year 1997

with CODE (808) Model year 1998

ENGINE
112.910 /911 /912 /913 /914 /916 /917 /920 /921 /922 /923 /940 /941 /942 /943 /944 /946 /947 /949 /953 /954 /9

ENGINE 113.940 /941 /942 /943 /948 /960 /961 /963 /965 /966 /967 /968 /969

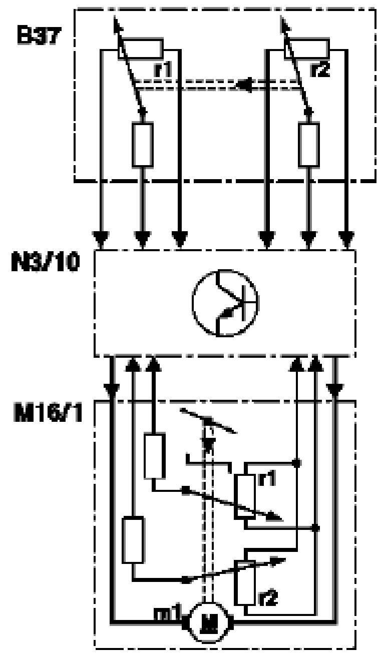
ENGINE 119.980 /981 /982 /985

ENGINE 137.970

B37 *Accelerator pedal sensor*
R1 Set value potentiometer 1 (or Hall sensor 1)
r2 Set value potentiometer 2 (or Hall sensor 2)

M16/1 *EA/CC/ISC [EFP/TPM/LLR] actuator*
(other designation: M16/6 throttle valve actuator)
M1 Actuator motor
r1 Actual value potentiometer 1
r2 Actual value potentiometer 2

N3/10 *ME-SFI control unit*



P30.20-0217-08

Fig. 1: Identifying Electronic Accelerator Function

The function of the electronic accelerator pedal EFP in the ME control unit determines the opening angle of the throttle valve over the actuator EFP/TPM/LLR (other designation: throttle valve actuator).

Further functions are:

- Idle speed control [ISC]
- Cruise control mode
- Variable speed limiter
- 30 km/hour limit
- Reduce/increase the engine torque for ASR/ESP operation
- short performance limitation, for example for a higher coolant temperature
- Emergency electronic accelerator pedal
- Safety concept
- Actuate indicator lamp EPC (up to 5/96)
- Storing faults
- Data exchanger via CAN

The opening angle of the throttle valve will only be determined by the accelerator pedal specification when no limiting functions are active.

The accelerator pedal position is detected by the set value potentiometer (B37r1) or Hall sensor in the pedal value sensor (B37) and information is released to the ME control unit (N3/10). In this way, the ME-SFI control unit determines the position of the throttle valve and actuates the throttle valve motor (M16/1 m1).

The actual value potentiometer in the actuator (M16/1r1) signals the throttle valve position back to the ME-SFI control unit.

The second potentiometer in the actuator (M16/1 r2) and the second signal from the pedal value sensor (potentiometer or Hall sensor) supplies a reference value for the plausibility check. In addition, the system switches over to the second potentiometer or the Hall sensor if the first potentiometer or Hall sensor fails (emergency mode).

Adaptive accelerator pedal (model 203, 209, 211, 215, 220, 230):

The engine control unit recognizes how the accelerator pedal is being actuated and switches between characteristic curves. Eighty percent of the engine load is released for a pedal travel of about 50 % for a sporty driver and about 40 % for a quiet driver. There is no further difference felt above a pedal travel of about 90 %.

USA

If, for example, the characteristic curve for a quiet driver is active after a long drive on the motorway then the accelerator pedal must be pressed down unusually hard to obtain a higher acceleration level.

Kickdown switch (S16/6)

The kickdown switch was no longer used from 9/01. Recognition of full load is now achieved over the signal from the pedal value sensor. The pressure point on the accelerator pedal before achieving the full load position remains.

	Motor electronics control unit, location/task/design/function	except M111 EVO M111 EVO	**GF07.61-P-5000F** GF07.61-P-5000GS
	Electronic accelerator/cruise control/idle speed control actuator location/task/design/function	except M111 EVO	**GF30.22-P-4010F**
	Throttle valve actuator, location/task/design/function	M111 EVO	GF30.22-P-4101GS
	Pedal value sensor, location/task/design/function		**GF30.20-P-4011L**
	ME-SFI idle speed control function	Except engine 120 and engine 111 EVO M111 EVO	**GF30.22-P-0003E** GF30.22-P-0003GS

Electronic power control indicator lamp, location/task/design/function	Engine 119, 120 in Model 129, 140 up to 5/96	GF30.20-P-4012L
Electronic accelerator pedal emergency running mode function	Engine 104, 111, 112, 113, 119, 137	**GF30.20-P-4026E**
30 km/h limit, function	Model 129, 140 with Engine 104, 119.98, 120.98 except GB J Nm	GF30.20-P-4027F
Cruise control (CC) function	With cruise control Engine 104 (except HFM sequential multiport fuel injection/ignition system), 119.98, 120.98 With cruise control Engine 111, 112, 113, 137	GF30.30-P-0001F **GF30.30-P-0001FA**
Variable speed limiter, function	Additional cruise control function except Nm J	GF30.30-P-3001A
Distronic (DTR), function	Model 220, 215 with code 219a up to 6/00 Model 203, 209, 211, 230 with code 219a Model 215, 220 with code 219a as of 7/00	GF30.30-P-0002K GF30.30-P-0002KA
Pedal value sensor characteristic curve when reversing function		**GF30.20-P-4013E**
ASR V control unit location/task/design/function	with code 471 a Model 129, 140, 202 as of 6/94, 170, 208, 210	GF42.40-P-4500A
ESP control unit location/task/function	with code 472a Model 129 with Engine 104, 119, 120 Model 140 Model 210 with engine 119 with code 472a Model 129 with engine 112, 113 Model 163 up to 8/02, 168, 215 Model 220 (except 220.08/18) Model 202, 208 with engine 112, 113 Model 210 with engine 111, 112, 113 with code 472a Model 170 with Engine 111, 112 Model 202, 208 with Engine 111 Model 203 Model 211, 230	GF42.45-P-4500A **GF42.45-P-4500B** GF42.45-P-4500C GF42.45-P-4500SL

PEDAL VALUE SENSOR POSITION - GF30.20-P-4011-01GH

Model 163

in left of component compartment

B37 Pedal value sensor (Hall principle)

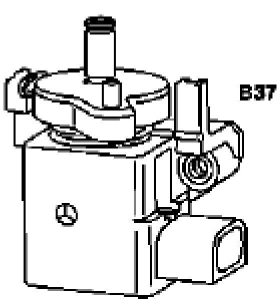


P30.16-2005-01

Fig. 2: Locating Pedal Value Sensor (Hall Principle)

PEDAL VALUE SENSOR DESIGN - GF30.20-P-4011-02B

with two Hall elements



B37 Pedal value sensor (with Hall principle)

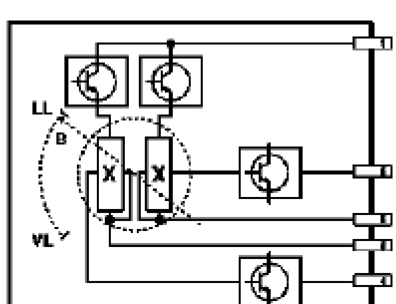
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Fig. 3: Identifying Pedal Value Sensor (With Hall Principle)

Illustration shows internal circuitry of pedal value sensor B37 (with Hall principle)

B magnetic flux density

X Component standard for Hall element



P30.20-0226-01

Fig. 4: Identifying Internal Circuitry Of Pedal Value Sensor

The pedal value sensor based on the Hall principle consists of two Hall elements, 2 magnets, electronics and a restoring spring. The magnets are moved by means of the linkage or cable attached to the pedal value sensor and thus alter the direction of the magnetic field relative to the fixed Hall elements. This produces a change in the voltage.

The pedal value sensor is supplied with 5V only at pin 1. Pin 2 is not connected internally. The information regarding the accelerator pedal position is passed to the engine control module by means of two voltages (pin 4: approx. 0 to 2.25V and pin 5: approx. 0 to 4.5V). The pedal value sensor with potentiometer can be replaced with the pedal value sensor based on the Hall principle (but **not** vice versa).

PEDAL VALUE SENSOR DESIGN - GF30.20-P-4011-02C

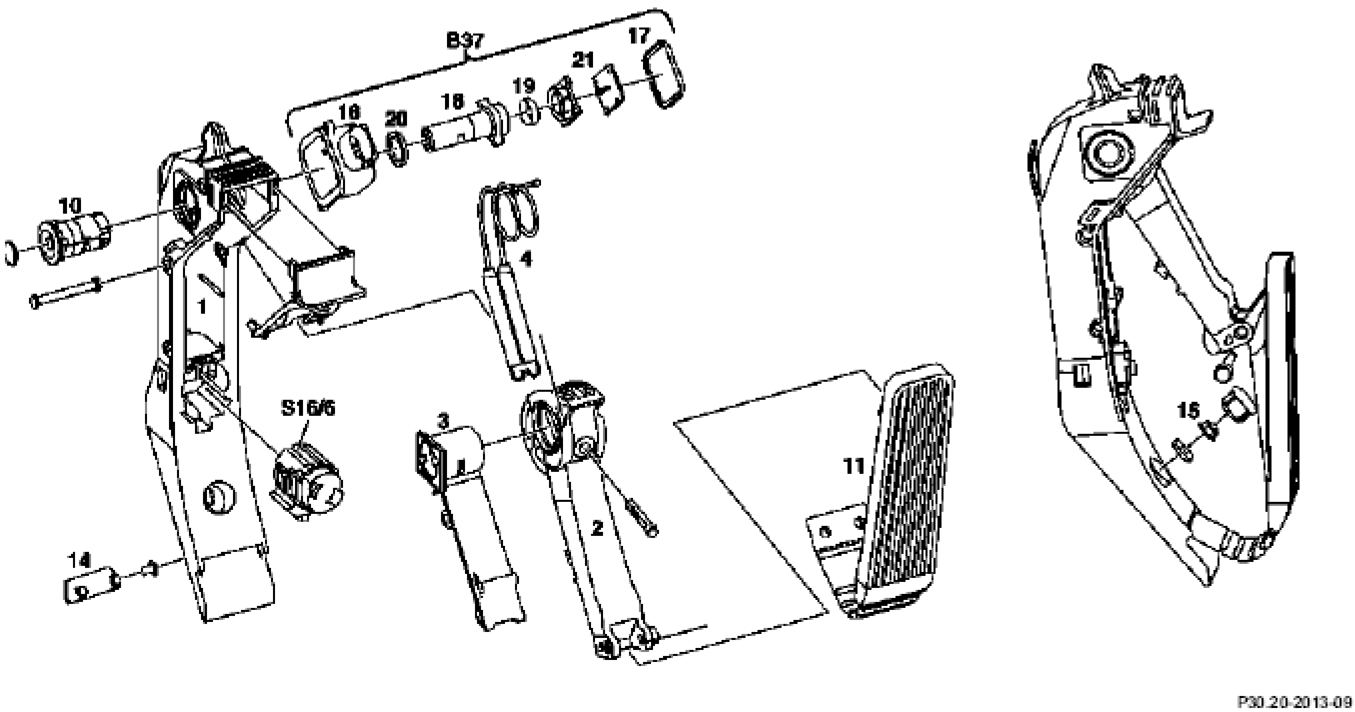
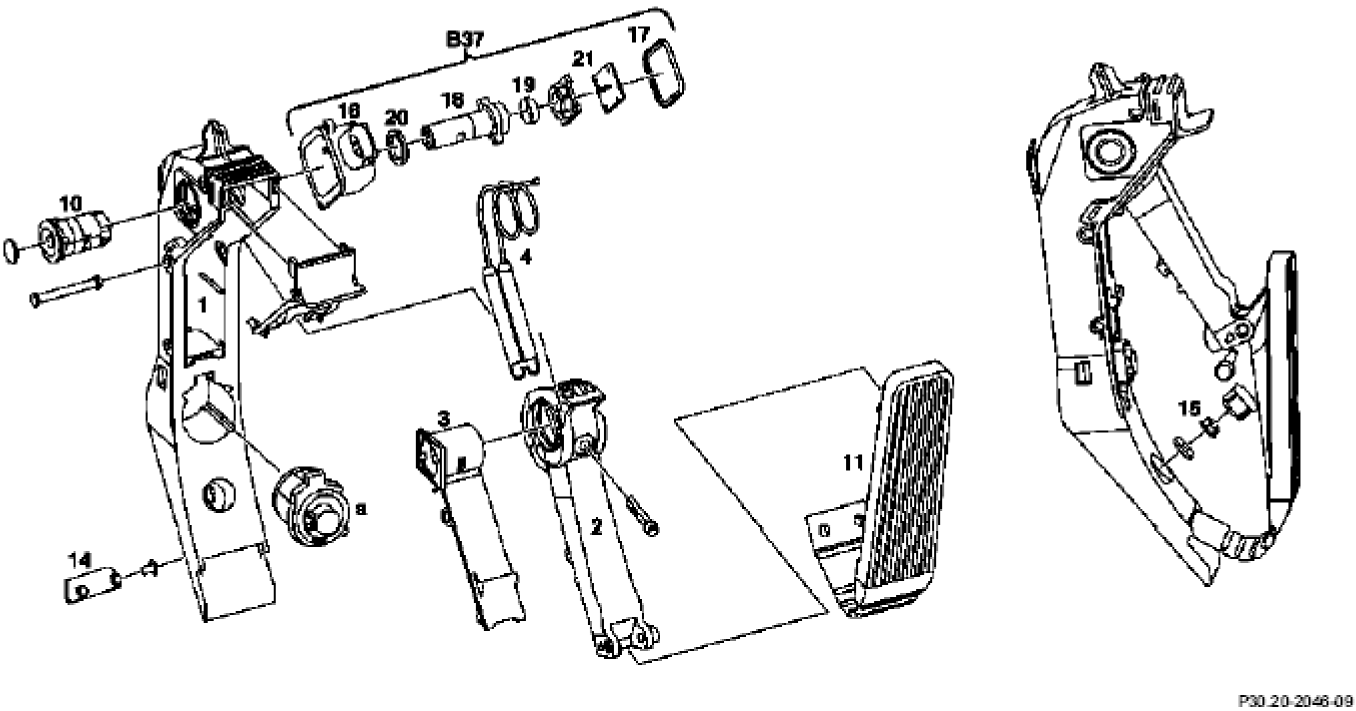


Fig. 5: Identifying Accelerator Pedal Module With Kickdown Switch (Up To 7/02) Components

Illustration shows accelerator pedal module with kickdown switch (S16/6).

Was only installed until about 7/02. One then used the accelerator pedal module with kick-down simulator (a).



1	Base plate	15	Cap	B37	Accelerator pedal sensor
2	Pedal lever	16	Housing of pedal value sensor	S16/6	Kickdown switch (up to 7/02)
3	Friction ring	17	Cover	A	Kickdown simulator
4	Friction cables with spring	18	Shaft with magnet mount		
10	Spline shaft	19	Ring magnet		
11	Accelerator pedal	20	Sealing ring		
14	Detent plate for attaching accelerator pedal	21	Printed circuit board with stator and Hall electronics		

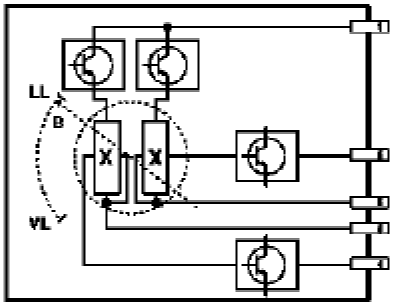
Fig. 6: Identifying Accelerator Pedal Module With Kickdown Simulator (From 7/02) Components

Illustration shows accelerator pedal module with kickdown simulator (a).

USA Replace accelerator pedal module always complete!

Illustration shows internal circuitry of pedal value sensor B37 (Hall principle)

B *Magnetic flux density*
X *Component standard for Hall element*
LL *Closed throttle position.*
VL *Full-load position*



P30.20-0226-01

Fig. 7: Identifying Internal Circuitry Of Pedal Value Sensor (Hall Principle)

The sensor on the accelerator pedal which works according to the Hall principle is integrated into the pedal lever axis. It consists of a shaft with ring magnet. This rotates in a printed circuit board with stator in the fixed Hall elements. This produces a change in the voltage.

The accelerator pedal sensor is supplied by the engine control unit with 5 V. The information regarding the accelerator pedal position is passed on to the engine control unit by means of two voltages (pin 4: approx. 0 to 2.25 V and pin 5: approx. 0 to 4.5V).

The kick-down switch (S16/6) was no longer used from 7/02. Full load recognition takes place now over the signal from the accelerator pedal sensor. The pressure point on the accelerator pedal is simulated before achieving the full load position.

PEDAL VALUE SENSOR, LOCATION/TASK/DESIGN/FUNCTION - GF30.20-P-4011L

ENGINE 104.941 /943 /944 /991 /994 as of 1.8.96

ENGINE 104.995

with CODE (494a) USA-Ausfuhrung

with CODE (807) Model year 1997

with CODE (808) Model year 1998

with CODE (498) as of Model Year 97 Japan-Ausfuhrung

ENGINE 111.921 /942 as of 1.9.98,

111.946 as of 1.6.98,

111.944/975 as of 1.8.96,

111.943 /947 /951 /952 /955 /956 /957 /958 /973 /974 /982 /983

ENGINE 111.945

in MODEL 202.020 /080 as of 1.9.98,

208.335/435 as of 1.6.98

with CODE (494a) USA-Ausfuhrung

with CODE (807) Model year 1997

with CODE (808) Model year 1998

ENGINE
112.910 /911 /912 /913 /914 /916 /917 /920 /921 /922 /923 /940 /941 /942 /943 /944 /946 /947 /949 /953 /954 /9

ENGINE 113.940 /941 /942 /943 /948 /960 /961 /963 /965 /966 /967 /968 /969

ENGINE 119.980 /981 /982 /985

ENGINE 120.982 /983

ENGINE 137.970

ENGINE 166.940 /960 /990 /995

ENGINE 604.910/915 as of 1.2.98

ENGINE 604.912/917 as of 1.4.98

ENGINE 611.961/960/962

ENGINE 612.961/962/963

ENGINE 613.960/961

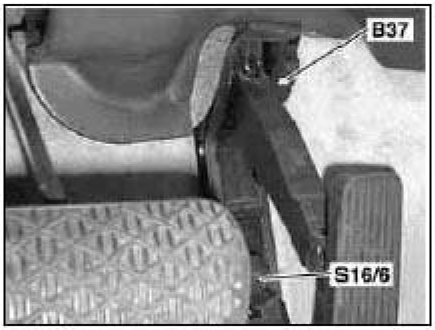
ENGINE 628.960 /963

ENGINE 668.940 /941 /942

ENGINE 612.967 in MODEL 209.316

Shown on model 203, 215, 220

B37 Accelerator pedal sensor (advanced designation; pedal value sensor)



P30.20-2012-01

Fig. 8: Identifying Accelerator Pedal Sensor - Shown On Model 203, 215, 220

Pedal value sensor position	Model 129	GF30.20-P-4011-01D
	Model 140	GF30.20-P-4011-01A
	Model 163	**GF30.20-P-4011-01GH**
	Model 168	GF30.20-P-4011-01GC
	Model 170	GF30.20-P-4011-01G
	Model 202, 208	GF30.20-P-4011-01E
	Model 203, 209	GF30.20-P-4011-01P
	Model 210	GF30.20-P-4011-01F
	Model 211	GF30.20-P-4011-01T
	Model 215, 220	GF30.20-P-4011-01M
	Model 230	GF30.20-P-4011-01R
Pedal value sensor task	Detects the accelerator pedal position and passes on the information to the engine control unit	
Pedal value sensor design	Located in engine compartment with two rotary potentiometers	GF30.20-P-4011-02A
	Located in engine compartment with two Hall elements	**GF30.20-P-4011-02B**
	Model 203, 209, 211, 215, 220, 230 and Model 170 with Engine 111 EVO and 112: Location at accelerator pedal module	**GF30.20-P-4011-02C**
	The accelerator pedal sensor (B37) converts the mechanical	

	Pedal value sensor function	actuation determined by the accelerator pedal into an electrical signal according to the accelerator pedal position.	
	Pedal value sensor characteristic curve when reversing function		**GF30.20-P-4013E**

PEDAL VALUE SENSOR CHARACTERISTIC CURVE WHEN REVERSING FUNCTION - GF30.20-P-4013E

ENGINE 104.943 /944 /991 /994 as of 1.8.96

ENGINE 104.995

with CODE (494a) USA version

with CODE (807) Model year 1997

with CODE (808) Model year 1998

with CODE (498) as of Model year 97 Japanese version

ENGINE 104.941 as of 1.8.96

ENGINE 111.921 /942 as of 1.9.98,

111.946 as of 1.6.98,

111.944/975 as of 1.8.96,

111.943 /947 /951 /952 /955 /956 /957 /958 /973 /974 /982 /983

ENGINE 111.945

in MODEL 202.020 /080 as of 1.9.98,

208.335/435 as of 1.6.98

with CODE (494a) USA version

with CODE (807) Model year 1997

with CODE (808) Model year 1998

ENGINE
112.910 /911 /912 /913 /914 /916 /917 /920 /921 /922 /923 /940 /941 /942 /943 /944 /946 /947 /949 /953 /954 /9

ENGINE 113.940 /941 /942 /943 /948 /960 /961 /963 /965 /966 /967 /968 /969

ENGINE 119.980 /981 /982 /985

ENGINE 120.982/983

ENGINE 137.970

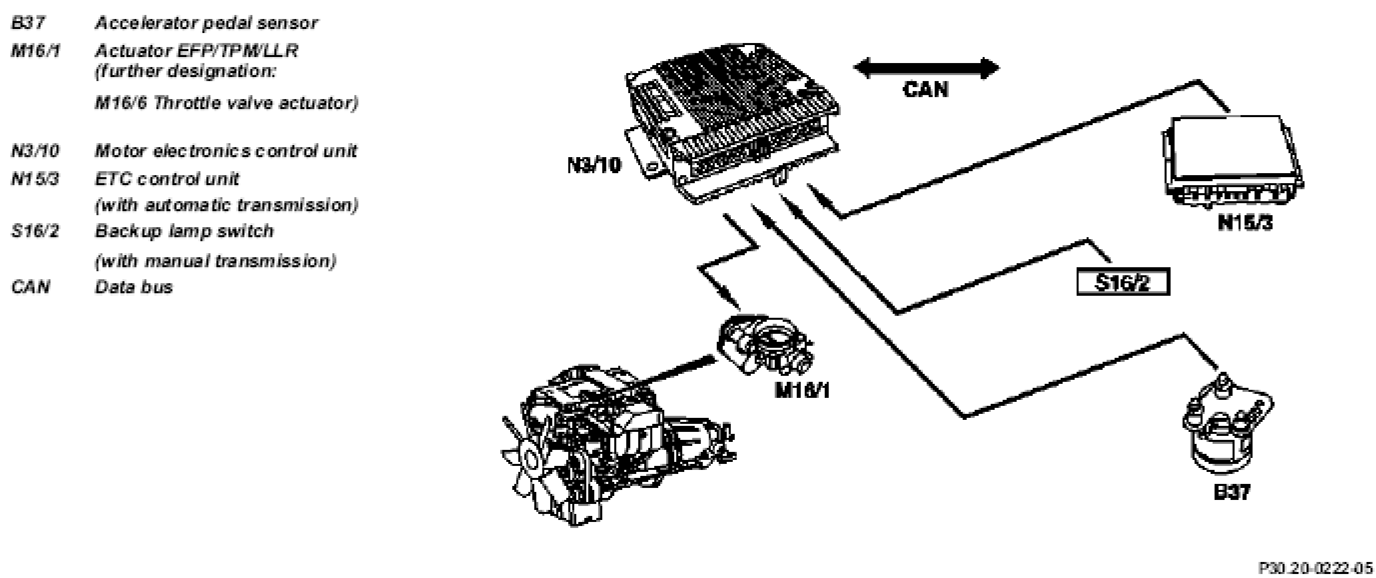


Fig. 9: Identifying Pedal Value Sensor Function Diagram

Task

Optimizing driving comfort and safety when reversing.

Design/function

The pedal value sensor characteristic curve is changed if reverse travel is recognized by the ME control unit. The throttle valve opens more slowly. The entire opening angle in this case is approx. 50%.

Reversing is detected:

- if a manual transmission fitted, the ME control unit is connected parallel to the reversing light switch.
- if an automatic transmission is fitted, the information is supplied over the CAN by the ETC control unit.

	Motor electronics control unit, location/task/ design/function	other than engine 111 EVO	**GF07.61-P-5000F**
		Engine 111 EVO	GF07.61-P-5000GS
	Pedal value sensor, location/task/design/ function		**GF30.20-P-4011L**
	Electronic accelerator/cruise control/idle speed		**GF30.22-P-**

	control actuator location/task/design/function		**4010F**
	Throttle valve actuator, location/task/design/ function	Engine 111 EVO	GF30.22-P-4101GS
	ETC control unit, location/task	Information on selector lever position P/N and gear engaged in the case of automatic transmission. Transmission 722.6	**GF27.19-P-4012G**

ELECTRONIC ACCELERATOR PEDAL EMERGENCY RUNNING MODE FUNCTION - GF30.20-P-4026E

ENGINE 104.941 /943 /944 /991 /994 as of 1/8/96

ENGINE 104.995

with CODE (494a) USA version

with CODE (807) Model year 1997

with CODE (808) Model year 1998

with CODE (498) as of Model year 97 Japanese version

ENGINE 111.921 /942 as of 1.9.98,

111.946 as of 1.6.98,

111.944/975 as of 1.8.96,

111.943 /947 /951 /952 /955 /956 /957 /958 /973 /982 /983

ENGINE 111.945

in MODEL 202.020 /080 as of 1.9.98,

208.335/435 as of 1.6.98

ENGINE 111.974

with CODE (494a) USA version

with CODE (807) Model year 1997

with CODE (808) Model year 1998

ENGINE
112.910 /911 /912 /913 /914 /916 /917 /920 /921 /922 /923 /940 /941 /942 /943 /944 /946 /947 /949 /953 /954 /9

ENGINE 113.940 /941 /942 /943 /948 /960 /961 /963 /965 /966 /967 /968 /969

ENGINE 119.980 /981 /982 /985

ENGINE 137.970

Task

To allow safe further driving depending on the fault which has arisen in the electronic accelerator pedal system.

Pedal value sensor emergency mode

If the sensor in the pedal value sensor (B37) fails, the system will switch over to the second sensor. The throttle valve opening is limited to approx. 60%. There is also dynamic limitation of the throttle valve's opening speed where the throttle valve opening is delayed (the indicator lamp EPC does not light up).

If the plausibility check delivers a negative result or both sensors are defect only the idling speed will be regulated (the indicator lamp EPC lights up).

Actuator for the throttle valve - emergency running, electrical

If a potentiometer in the actuator for the throttle valve breaks down the system switches-over to the second intact potentiometer. The air flow mass serves as a second parameter for comparative purposes. Following a plausibility check, the throttle valve opening is limited to approx. 60% in line with engine speed and load (EPC indicator lamp does not come on).

If the plausibility check is negative or if both potentiometers are faulty, the throttle valve adopts a mechanical emergency running position which is fixed by the spring capsule in the actuator (EPC indicator lamp comes on).

Actuator for the throttle valve - emergency running, mechanical emergency running stop

If the actuator motor is defect or there are other faults present the power supply to the actuator will be shut off. The throttle valve then lies on the mechanical stop (spring box) so the throttle valve opening remains at a constant 10-12°. At no engine load (idling) engine speed is regulated to about 900 rpm by shutting off or activating the cylinders at the fuel side.

When driving, engine speed is controlled, in line with the engine load, by switching the cylinders off and on at the fuel side. The maximum engine speed is about 1800 rpm. which is limited by the mechanical stop (the indicator lamp EPC lights up).

Safety fuel shutoff

If a mechanical fault exists in the actuator, the safety fuel shutoff is activated.

Here the fuel injection valves are shut off for engine speeds < 1400 rpm and actuated again at speeds < 1200 rpm (the indicator lamp EPC lights up).

USA

If the faults described above exist, read out the fault memory. The indicator lamp EPC is only installed on types 129, 140 from about 4/95 to 6/96.

	Pedal value sensor, location/task/design/ function		**GF30.20-P-4011L**
	Electronic accelerator/cruise control/idle speed control actuator location/task/design/function	other than engine 111 EVO	**GF30.22-P-4010F**
	Throttle valve actuator, location/task/design/ function	Engine 111 EVO	GF30.22-P-4101GS
	Electronic power control indicator lamp, location/task/design/function	Engine 119.98, 120.98 in Model 129, 140 up to 5/96	GF30.20-P-4012L
	Motor electronics control unit, location/task/ design/function	other than engine 111 EVO	**GF07.61-P-5000F**
		Engine 111 EVO	GF07.61-P-5000GS

ME-SFI IDLE SPEED CONTROL FUNCTION - GF30.22-P-0003E

ENGINE 104.941 /943 /944 /991 /994 as of 1/8/96

ENGINE 104.995

with CODE (494a) USA version

with CODE (807) Model year 1997

with CODE (808) Model year 1998

with CODE (498) as of Model year 97 Japanese version

ENGINE 111.921 /942 as of 1.9.98,

111.943,

111.944 as of 1.8.96,

111.946 as of 1.6.98,

111.947/973,

111.975 as of 1.8.96

ENGINE 111.945

in MODEL 208.335 /435 as of 1.6.98,

202.020/080 as of 1.9.98

ENGINE 111.974

with CODE (494a) USA version

with CODE (807) Model year 1997

with CODE (808) Model year 1998

ENGINE 112.910 /911 /912 /913 /914 /916 /917 /920 /921 /922 /923 /940 /941 /942 /943 /944 /946 /947 /949 /953 /954 /9

ENGINE 113.940 /941 /942 /943 /948 /960 /961 /963 /965 /966 /967 /968 /969

ENGINE 119.980 /981 /982 /985

ENGINE 137.970

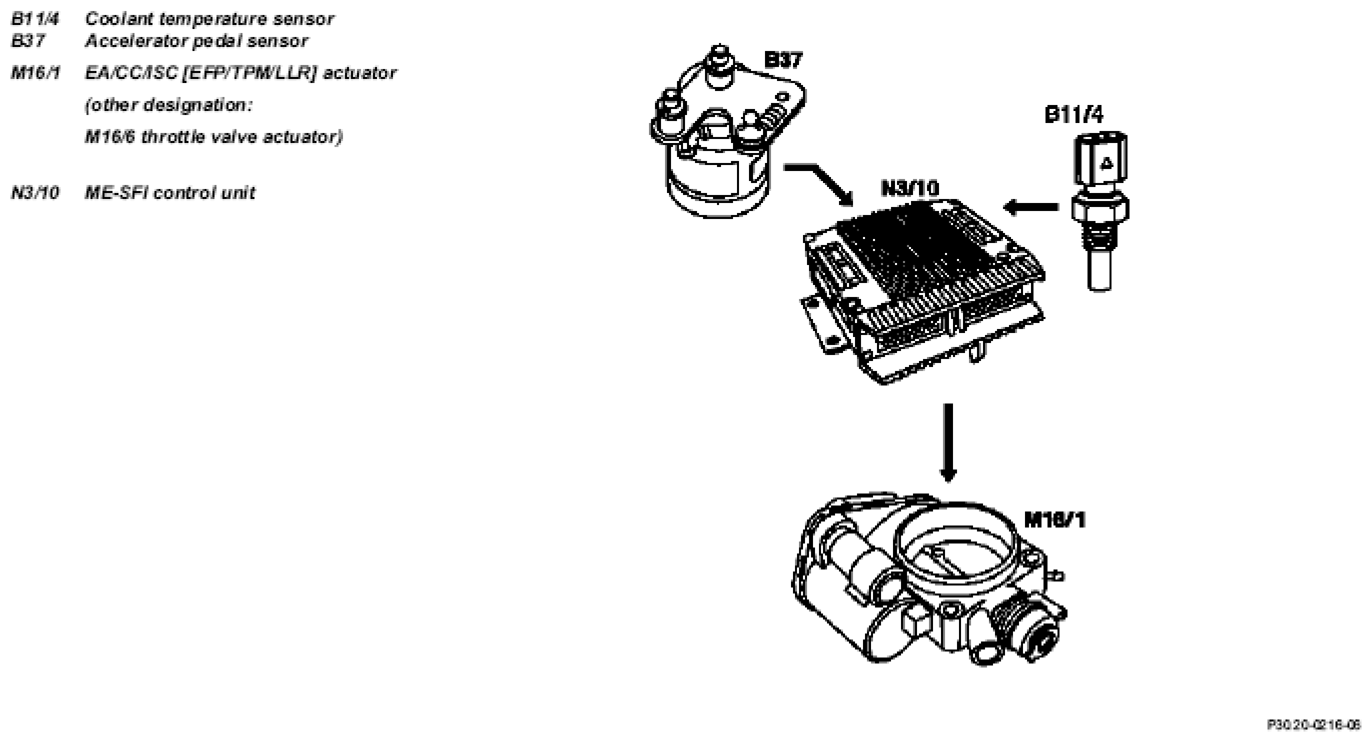


Fig. 10: Identifying ME-SFI Idle Speed Control Function Diagram

Task

Controlling idle speed in the case of

- different engine loads, e.g. power steering turned to full lock, engaging drive mode, switching on AC compressor
- different mixture, e.g. from activated charcoal canister if purging activated (depending on activated charcoal charge)

Function

The actuator EFP/TPM/LLR (additional designation: throttle valve actuator) regulates the idling speed by changing the throttle valve position. It is actuated by the ME-SFI control unit.

The ME-SFI control unit actuates the throttle valve motor (M16/1 m1) in line with the input signals received at the ME-SFI control unit (N3/10).

Heating speed of the catalytic converter

In order to warm up the catalytic converter more rapidly to operating temperature, engine speed is increased in the idle speed range to 1100 up to 1500 rpm for about 20 seconds after each starting procedure at coolant temperatures of < 40 °C. When a Drive position is engaged, engine speed is immediately controlled to a lower value.

Automatic transmission

When a drive position is engaged, a lower engine speed is controlled in order to reduce the creeping tendency of the vehicle. The information "Drive position engaged/not engaged" is transmitted by the ETC control unit (N15/3) over the CAN databus to the ME-SFI control unit.

Ignition angle

To assist the idle speed control, the ignition angle can be retarded by as much as 36° crank angle or advanced by as much as 20° crank angle from the calculated specified value.

USA

The control in the idle speed range by altering the ignition angle reacts more rapidly than altering the position of the throttle valve.

The idling speed can be influenced with HHT or the STAR DIAGNOSIS.

AC compressor

In order to avoid engine speed dropping in the idle speed range when the AC compressor is engaged, the AC push-button control unit (N19) or automatic air conditioning push-button control unit (N22) supplies a signal to the ME-SFI control unit (as of approx. 6/96 over CAN) and the opening cross-section of the throttle valve is enlarged.

When the air conditioning unit is switched on and the external temperature exceeds 35° C the idling speed on

vehicles delivered from 6/00 is increased for the driving mode selected by about 100 rpm when the switch-on threshold of about 900 rpm is exceeded. This increase is cancelled again when the external temperature drops below 32° C.

Undervoltage

If the engine control unit detects an undervoltage the idling speed is increased until the ignition is switched off for the driving mode selected by about 100 rpm.

If the control unit SBC reports an undervoltage to the engine control unit over CAN the idling speed for the driving mode selected is increased to about 750 rpm.

Motor electronics control unit, location/task/ design/function		**GF07.61-P-5000F**
ME-SFI ignition system function		**GF15.12-P-0001F**
ECI ignition system function	Engine 137	GF15.15-P-3000L
Pedal value sensor, location/task/design/ function		**GF30.20-P-4011L**
Coolant temperature sensor, location/task/ design/function	Engine 119, 120	GF07.04-P-5026F
	Engine 104, 111	GF07.04-P-5026G
	Engine 112, 113, 137	**GF07.04-P-5026A**
Intake air temperature sensor, location/task/ design/function		**GF07.04-P-2100F**
ME fuel supply function	Engine 104, 111, 119, 120 in Model 129, 140, 170, 202, 208, 210	GF07.61-P-3004F
	Engine 112, 113, 137 (except in Model 203, 209, 211)	**GF07.61-P-3004A**
	Engine 112.91/94/95 203 Engine 112.91/94/95, 113.96 in Model 211 Engine 112.912/955, 113.968 in Model 209	GF07.61-P-3004P
Crankshaft position sensor, location/task/ design/function		**GF07.04-P-4116F**
Electronic accelerator/cruise control/idle speed control actuator location/task/design/function		**GF30.22-P-4010F**
Electronic accelerator pedal emergency running mode function	Engine 120.98	GF30.20-P-4026F
	Engine 104, 111, 112, 113, 119, 137	**GF30.20-P-4026E**

ME-SFI TWC heating-up function		**GF07.61-P-3032F**
ETC control unit, location/task	Information on selector lever position P/N and gear engaged in the case of automatic transmission. Transmission 722.6	**GF27.19-P-4012G**
Clutch pedal switch, location/task/function	with MT	GF29.10-P-2100F
SBC control unit, location/task/function	Model 211, 230: Request for increased idle speed	GF42.46-P-4500SL

ELECTRONIC ACCELERATOR/CRUISE CONTROL/IDLE SPEED CONTROL ACTUATOR POSITION - GF30.22-P-4010-01A

M16/6 Throttle valve actuator

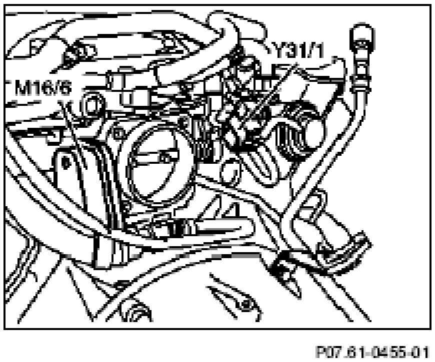


Fig. 11: Identifying Throttle Valve Actuator

ELECTRONIC ACCELERATOR/CRUISE CONTROL/IDLE SPEED CONTROL ACTUATOR DESIGN - GF30.22-P-4010-02F

Illustration shows actuator M16/4 *(further designations: M16/1, M16/3, M16/6 throttle valve actuator)*

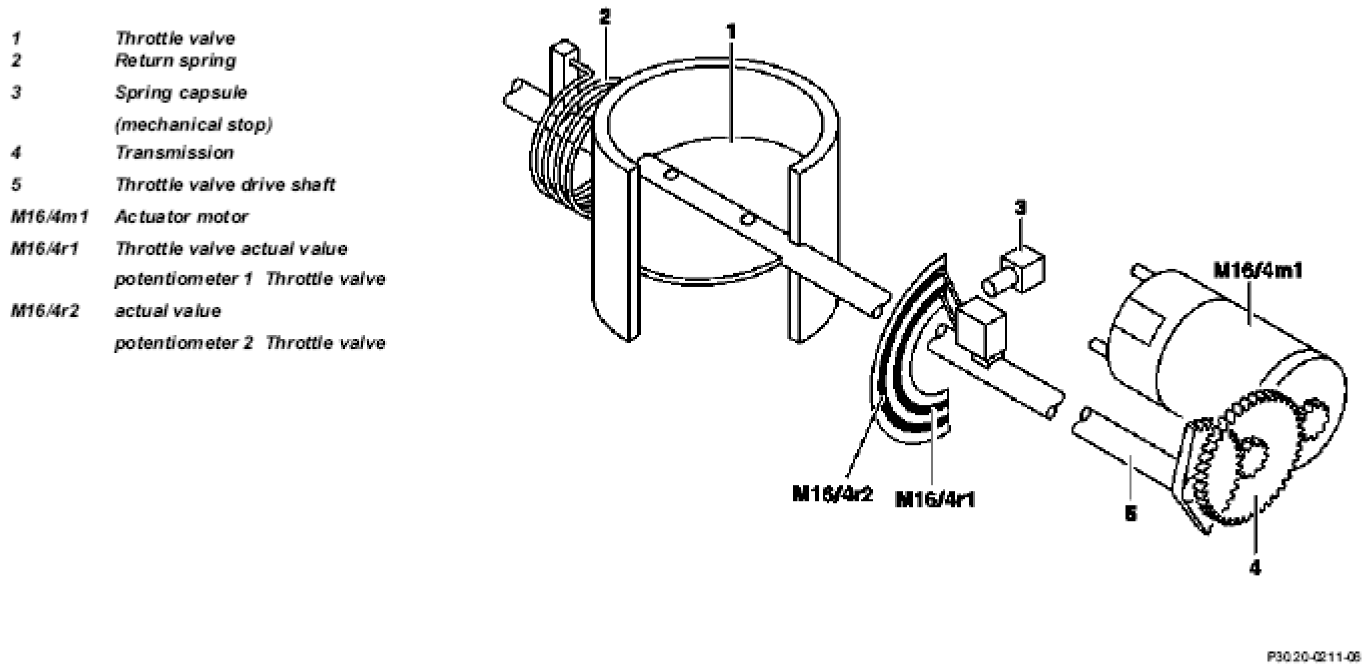


Fig. 12: Identifying Electronic Accelerator/Cruise Control/Idle Speed Control Actuator Components

Each actuator contains two actual value potentiometers for detecting the position of the throttle valve. The second potentiometer is used as a reference value to the plausibility check. In addition, the system switches over to the second potentiometer if the first potentiometer fails.

ELECTRONIC ACCELERATOR/CRUISE CONTROL/IDLE SPEED CONTROL ACTUATOR FUNCTION - GF30.22-P-4010-03F

Illustration shows actuator M16/4

1	Throttle valve
2	Return spring 3 Spring capsule (mechanical stop)
4	Transmission
5	Drive shaft throttle valve
M16/4	m1Actuator motor
M16/4r1	Actual value potentiometer 1 Throttle valve
M16/4r2	Actual value potentiometer 2 Throttle valve

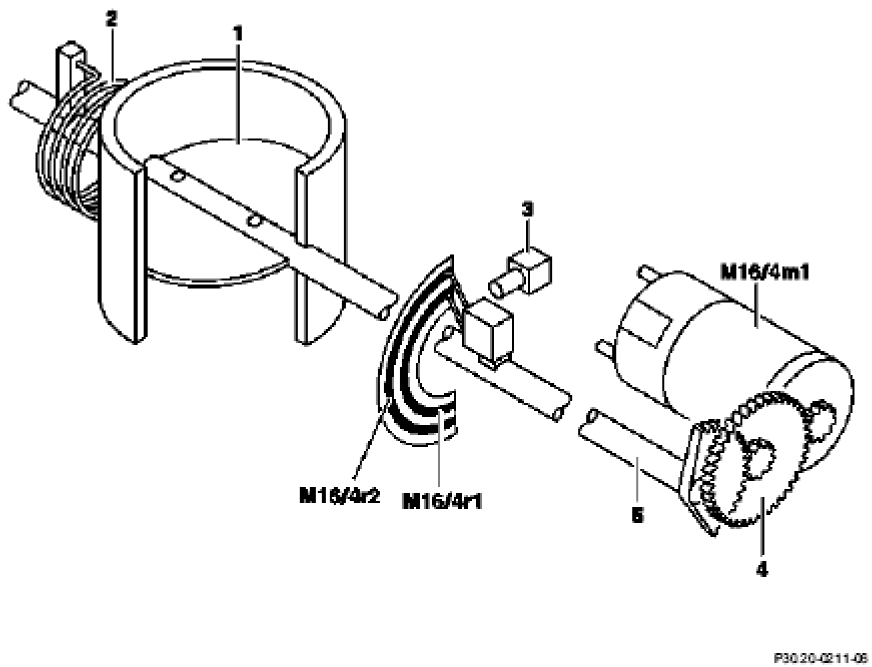


Fig. 13: Identifying Electronic Accelerator/Cruise Control/Idle Speed Control Actuator Components

Function

The actual value potentiometers for the throttle valve inform the ME control unit about the position of the throttle valve (idling up to full load) in order to recognize the various loading conditions.

A. **Ignition "Off"**

In the de-energized state the throttle valve position is determined by the spring capsule (3).

B. **Ignition "On"**

When the ignition is switched on, the actuator motor in the EA/CC/ISC actuator is operated by the ME control unit and the return spring is checked. The throttle valve adopts a position which then depends on the coolant temperature.

C. **Idle speed**

The actuator motor controls the engine speed in the idle speed range by opening the throttle valve further, depending on coolant temperature and engine load (increased mixture), or closing it further (reduced mixture).

In this case, the throttle valve may be closed further by the actuator motor by overcoming the force of the spring capsule (mechanical end stop).

If the actuator is de-energized, the throttle valve is resting against the spring capsule. As a result the throttle valve opening is constantly approx. 10 to 12 °. The engine speed for the no load condition is about 1800 rpm.

D. **Driving mode**

The actuating motor when driving (partial/full load) regulates the throttle valve according to the various loading conditions or according to the input signals from the front pedal value sensor (B37) according to the position of the accelerator pedal.

E. **Throttle valve damping**

A damping function for the throttle valve is integrated in the ME control unit. In case of a sudden release of the accelerator, the throttle valve in the idle speed range is closed with delay.

USA

When first connecting to terminal 30 the ME control unit independently undertakes adaptation of the actuator (learn the lower mechanical limit stop and full-load position of the throttle valve).

ELECTRONIC ACCELERATOR/CRUISE CONTROL/IDLE SPEED CONTROL ACTUATOR LOCATION/TASK/DESIGN/FUNCTION - GF30.22-P-4010F

ENGINE 104.941 /943 /944 /991 /994 as of 1/8/96

ENGINE 104.995

with CODE (494a) USA version

with CODE (807) Model year 1997

with CODE (808) Model year 1998

with CODE (498) as of Model year 97 Japanese version

ENGINE 111.921 /942 as of 1.9.98,

111.943,

111.944 as of 1.8.96,

111.946 as of 1.6.98,

111.947/973,

111.975 as of 1.8.96

ENGINE 111.945

in MODEL 208.335 /435 as of 1.6.98,

202.020/080 as of 1.9.98

ENGINE 111.974

with CODE (494a) USA version

with CODE (807) Model year 1997

with CODE (808) Model year 1998

ENGINE
112.910 /911 /912 /913 /914 /916 /917 /920 /921 /922 /923 /940 /941 /942 /943 /944 /946 /947 /949 /953 /954 /9

ENGINE 113.940 /941 /942 /943 /948 /960 /961 /963 /965 /966 /967 /968 /969

ENGINE 119.980 /981 /982 /985

ENGINE 120.982/983

ENGINE 137.970

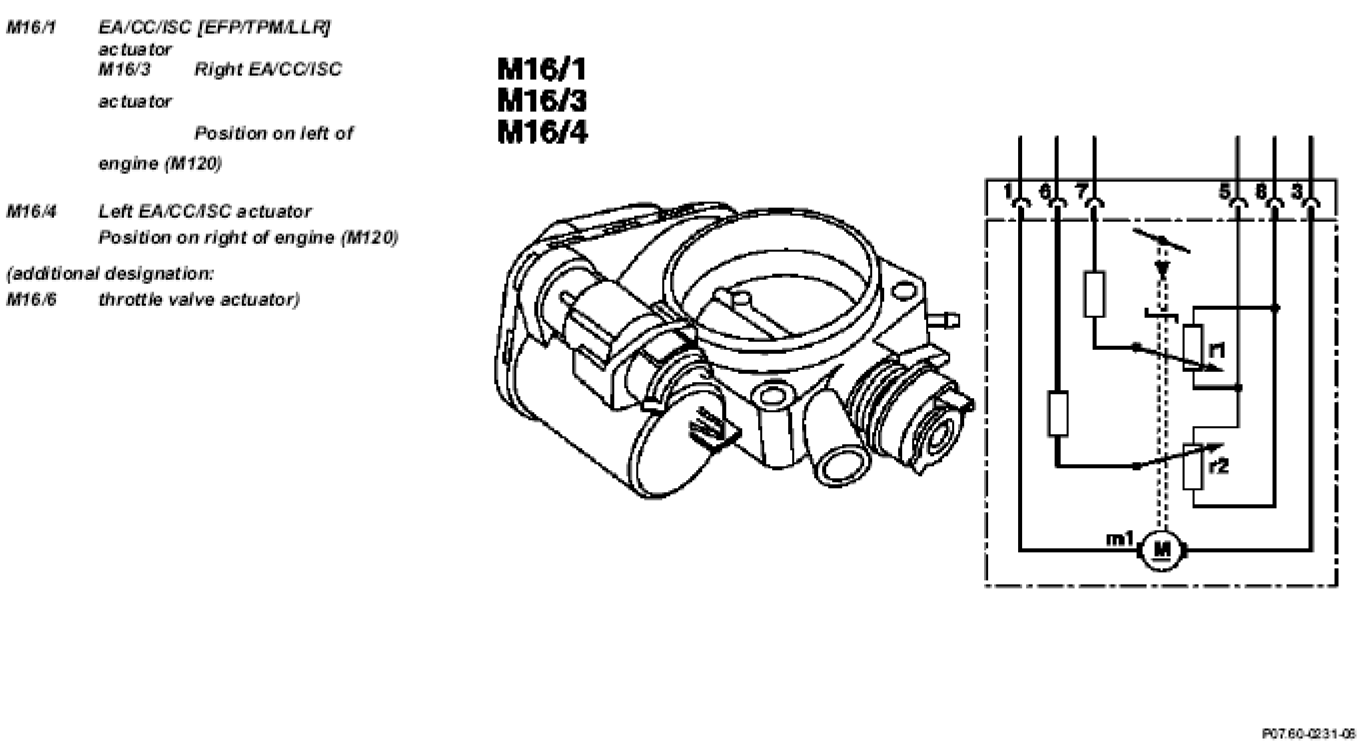


Fig. 14: Identifying Electronic Accelerator/Cruise Control/Idle Speed Control Actuator Function

	Electronic accelerator/cruise control/idle speed control actuator position	Engine 104 Engine 111 Engine 112, 113 Engine 119 Engine 120 Engine 137	GF30.22-P-4010-01D GF30.22-P-4010-01G **GF30.22-P-4010-01A** GF30.22-P-4010-01E GF30.22-P-4010-01F GF30.22-P-4010-01L
	Electronic accelerator/cruise control/idle speed control actuator task	Determining the opening angle of the throttle valve in accordance with the operating condition: • Controlling idle speed under different engine loads (power steering turned to full lock, AC compressor engaged) • Cruise control mode • Emergency electronic accelerator pedal • Driving, in accordance with accelerator pedal position.	
	Electronic accelerator/cruise control/idle speed control actuator task		**GF30.22-P-4010-02F**
	Electronic accelerator/cruise control/idle speed control actuator function		**GF30.22-P-4010-03F**

CRUISE CONTROL (CC) FUNCTION - GF30.30-P-0001FA

ENGINE 112.923 /943, 113.961, 120.983 in MODEL 129

ENGINE 112.942 /970, 113.942 /965 in MODEL 163

ENGINE 111.943 /946 /958 /973 /983, 112.947 in MODEL 170

ENGINE 111.921 /944 /945 as of 1.8.99,

111.952/956/974,

111.975 as of 1.8.99,

112.910/920,113.944

in MODEL 202

ENGINE 111.951 /955, 112.912 /916 /946 /953 in MODEL 203

ENGINE 111.945/975#2,

111.945 /975 #0 as of 1.8.99,

111.956/982, 112.940, 113.943

in MODEL 208

ENGINE 111.957, 112.911 /914/921 /941, 113.940/980,

111.942/947 as of 1.8.99

in MODEL 210

ENGINE 112.922 /944 /972 /975, 113.941 /948 /960 /966, 137.970 in MODEL 220

ENGINE 113.960, 137.970 in MODEL 215

ENGINE 112.973, 113.963 in MODEL 230

ENGINE 112.913 /917 /949 /954, 113.967 /969 in MODEL 211

ENGINE 112.912 /955, 113.968 in MODEL 209

Shown on engine 111 EURO3/4 B37

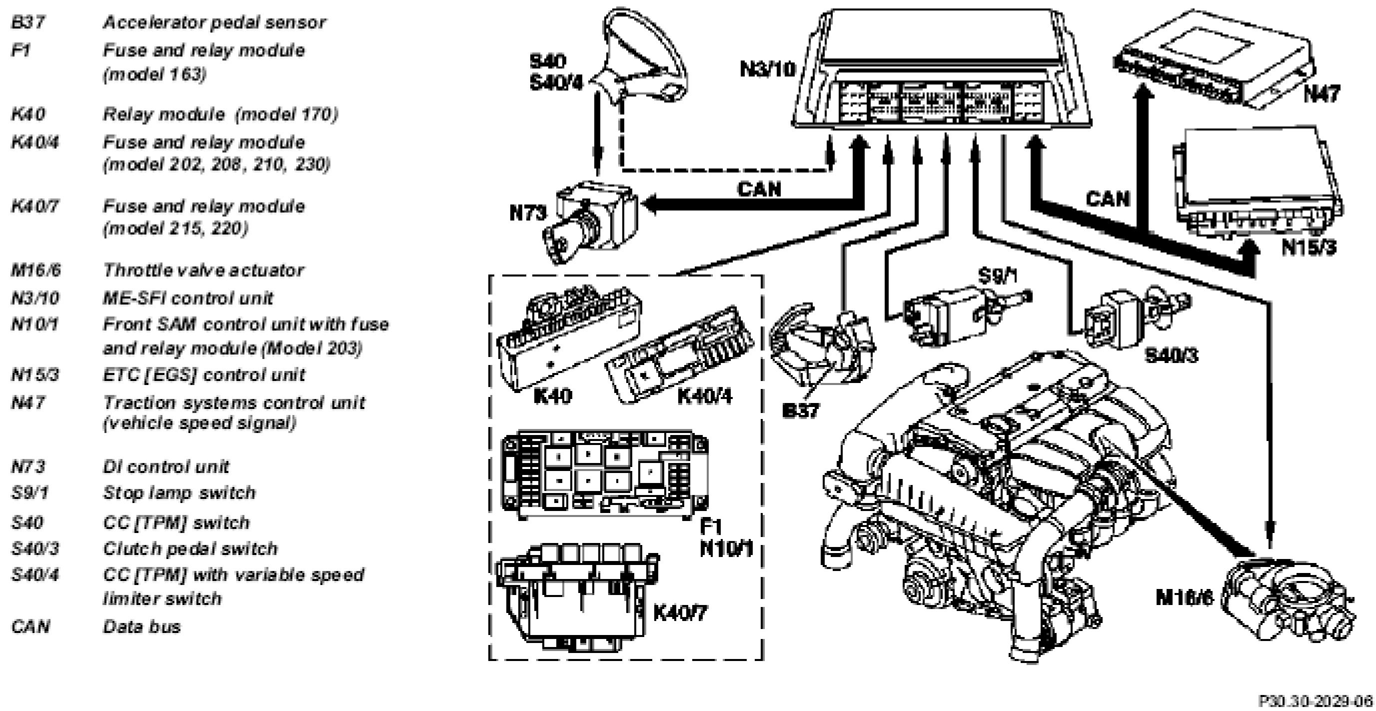


Fig. 15: Identifying Cruise Control Function - Shown On Engine 111 Euro3/4

Task

Maintaining the preselected vehicle speed constant irrespective of the engine load, without operation of the accelerator pedal.

Function

The cruise control function is integrated in the engine control unit. It can be activated from > 40 km/h with the cruise control switch. The engine control unit operates the throttle valve actuator for the cruise control function with the aid of the input signals and the position of the cruise control switch.

The cruise control mode is switched off by:

- pushing the cruise control push-button switch (S40) or variable cruise control push-button switch (S40/4) into the "OFF" position
- Operating the service brake
- Moving selector lever into position "N"
- Control intervention function of traction system

Vehicles with column sleeve module (MRM)

The signals from the push-button switch for the cruise control are detected by the steering column module and transmitted to the CAN data bus.

Vehicles with EZS control unit without column sleeve module (MRM)

The signals from the push-button switch for the cruise control are detected by the control unit EIS and transmitted to the CAN data bus.

Vehicles without EZS control unit

The signals from the cruise control switch are transmitted directly to the engine control unit.

Vehicles with manual transmission (MT)

Cruise control remains active during gear change, in other words the cruise control is not switched off when the clutch is operated.

Traction systems control unit

Transmits the vehicle speed signal via CAN to the ME control unit.

Motor electronics control unit, location/task/design/function	other than engine 111 EVO	**GF07.61-P-5000F**
	Engine 111 EVO	GF07.61-P-5000GS
Cruise control switch, location/task/design/function	with cruise control or Distronic	**GF30.30-P-3100F**
Variable cruise control switch, location/task/design/function	with cruise control or Distronic except	GF30.30-P-3101A
Electronic accelerator/cruise control/idle speed control actuator location/task/design/function		**GF30.22-P-4010F**
Throttle valve actuator, location/task/design/function	Engine 111 EVO	GF30.22-P-4101GS
Stop lamp switch, location/task/function		**GF42.10-P-4000A**
Clutch pedal switch, location/task/function	with MT	GF29.10-P-2100F
Variable speed limiter, function	Additional cruise control function except	GF30.30-P-3001A
ETC control unit, location/task	Transmits information about the selector lever position P/N and the driving mode selected via CAN. Transmission 722.6	**GF27.19-P-4012G**

CRUISE CONTROL SWITCH, LOCATION/TASK/DESIGN/FUNCTION - GF30.30-P-3100F

ENGINE 104 (except 104.98),

111.946 up to 31.5.98,

111.943,

111.973 up to 31.5.97,

111.920,

111.921 up to 31.8.98,

111.941,

111.942 up to 31.8.98,

111.944 up to 31.5.98,

111.945 up to 31.8.98, 111.974,

111.947/970, 112.942 up to 31.5.98,

119, 120 up to 31.5.97,

668.940/941,611.960/961

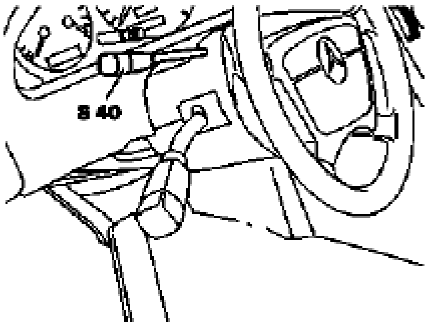
with CODE (440a) Cruise control

with CODE (443a) Cruise control and electrically adjustable steering column (codes 400 and 441)

with CODE (446) Cruise control, electrically adjustable steering column and airbag (440, 441 and 442)

ENGINE 104, 111, 112, 113, 119, 120, 137, 613.960, 628.960 (except, 112.96, 113.99) with CODE (494a) USA version

S40 CC [TPM] switch



P30.20-0214-01

Fig. 16: Identifying Cruise Control Switch

Cruise control switch location	Left top behind the steering wheel.
Cruise control switch task	• Setting of cruise control and Distronic. • With 30 km/h limitation: Switch on and off 30 km/h limitation when below 30 km/h.
Cruise control switch design	Push-button switch with several switching contacts.
Cruise control switch function	When the cruise control push-button switch is operated, two switching contacts are always activated simultaneously. The actual input takes place by closing one of the switching contacts (e.g. storing the speed). The safety contact must close simultaneously so that the input is accepted.

KICKDOWN SWITCH LOCATION/TASK/DESIGN/FUNCTION - GF30.30-P-4000A

ENGINE 112, 113, 119, 120 in MODEL 129

ENGINE 104, 119, 120 in MODEL 140

ENGINE 112, 113 in MODEL 163

ENGINE 166 in MODEL 168

ENGINE 111,112 (except, 112.96) in MODEL 170

ENGINE 111,112, 113 in MODEL 202

ENGINE 111,112 (except, 112.96) in MODEL 203

ENGINE 111,112, 113 in MODEL 208

ENGINE 111,112, 113 in MODEL 210

ENGINE 112,113,137 (except, 113.99) in MODEL 220

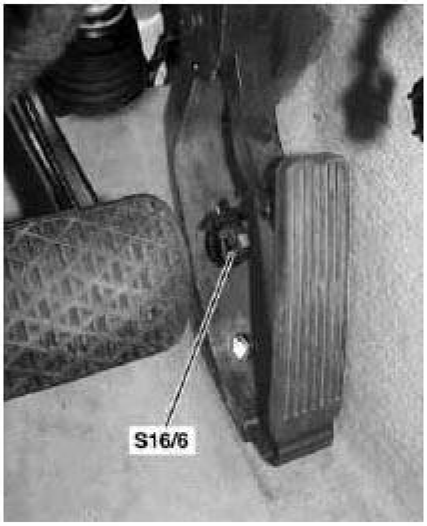
ENGINE 113,137 (except 113.99) in MODEL 215

ENGINE 112,113 (except, 113.99) in MODEL 230

ENGINE 112, 113 in MODEL 211

ENGINE 112, 113 in MODEL 209

S16/6 Kickdown switch



P27.19-2052-02

Fig. 17: Identifying Kickdown Switch

Kickdown switch position	in footwell behind accelerator pedal	
Kickdown switch task	Identify kickdown position of accelerator pedal, in order to influence transmission control, cruise control, variable speed limiter and Distronic.	
Kickdown switch design	Up to approx. 6/02 designed as an electrical switch (S16/6). As of approx. 7/02 (without engine 166) the electrical switch is replaced by the Kickdown simulator (spring).	**GF30.20-P-4011-02C**
Kickdown switch function	Engine 111, 112, 113, 119, 120, 137 up to approx 6/02 and Engine 166: on closed contact the ground is switched to the engine control unit As of approx. 7/02 (without Engine 166): Kickdown recognition is performed via the signal of the accelerator pedal sensor.	

SAFETY PRECAUTIONS

SAFETY INFORMATION: THROTTLE CONTROL, CRUISE CONTROL SYSTEM - AS30.00-Z-9999ZZ

MODEL all

AH	Risk of injury to skin and eyes from laser beams	MODEL all	**AS30.30-Z-0001-01A**

RISK OF INJURY - AS30.30-Z-0001-01A

Never look directly into the laser beam. Do not attempt to suppress the natural reflex of the eyelids. Avoid direct skin contact with the laser beam. If eye damage is suspected, consult an eye specialist without delay.

Risk of injury!

Class 2 lasers emit a visible radiation. Looking directly into the laser beam can result in damage to the eye.

The reflected laser beam can likewise cause damage to the eye.

For this reason, avoid reflections of the laser beam by using mirrors and similar aids. Laser beams may also cause skin damage.

Safety instructions/precautions

- Never look directly into the laser beam.
- Do not attempt to suppress the natural reflex of the eyelids.

  USA The eye is normally protected by defensive reactions including the reflex of the eyelid closing.

- Avoid direct skin contact with the laser beam.
- If damage to the eye is suspected, consult an eye specialist immediately.
- It is prohibited to further bundle the laser beam and thus to concentrate the energy (increasing the laser class).
- Only properly instructed personnel may be entrusted with the work on this equipment.

TESTING & REPAIR

ADJUST THROTTLE CONTROL - AR30.10-P-1010GJ

ENGINE 112.942 #2 in MODEL 163.154

ENGINE 112.970 #2 in MODEL 163.157

ENGINE 113.942 #2 in MODEL 163.172

ENGINE 113.981 #2 in MODEL 163.174

ENGINE 113.965 #2 in MODEL 163.175

Shown on Engine 112.942 in Model 163.154

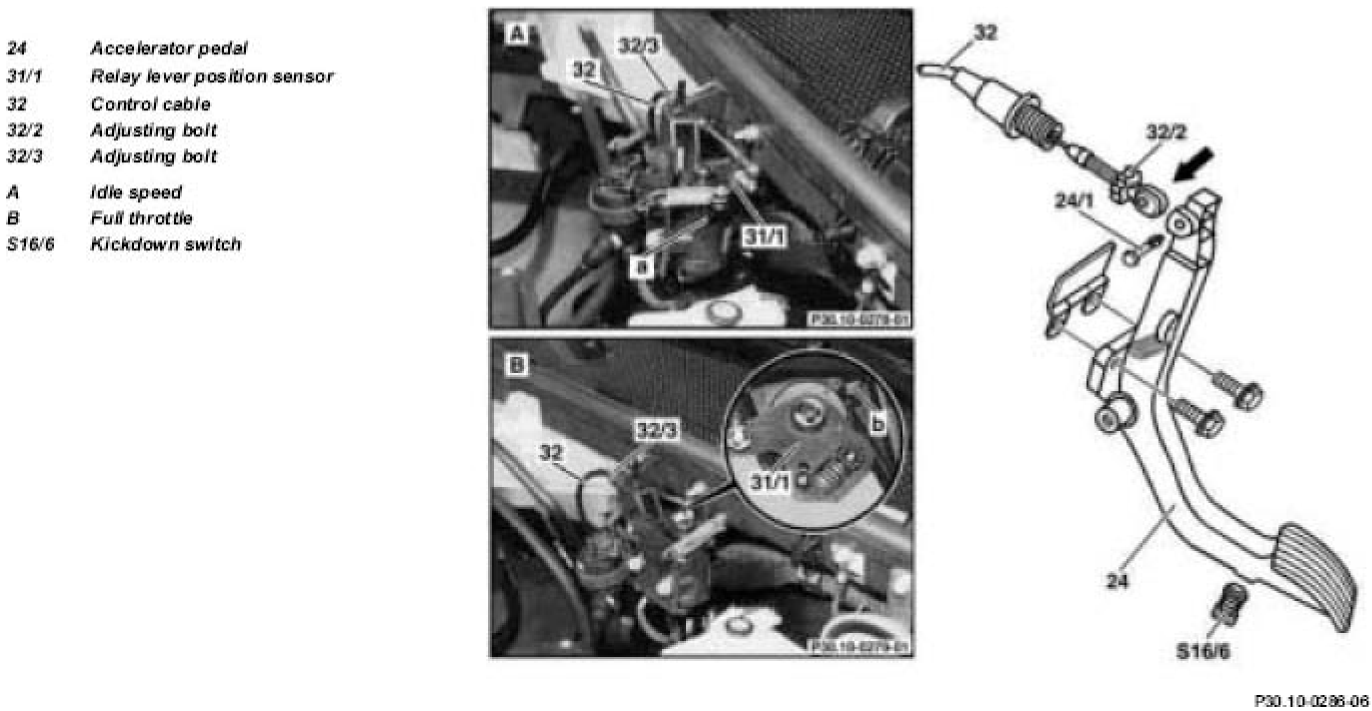


Fig. 18: Identifying Throttle Control Adjustment Components

	Inspection	
1	Check ease of movement and condition of relay lever position sensor (31/1) and control cable (32)	USA Replace parts if necessary.
	Setting	
2	Depress accelerator (24) until it rests against the kickdown switch (S16/6)	USA Full throttle position. USA Do not operate kickdown switch (S16/6)!
3	Twist adjusting screw (32/3) until relay lever position sensor (31/1) rests against full throttle stop (b)	USA Do not overstretch control cable (32).
4	The relay lever position sensor (311) must rest against the closed throttle stop (a) when the accelerator pedal is relieved	USA Closed throttle position.
5	Twist adjusting nut (32/2) until relay lever position sensor (31/1) rests against closed throttle stop (a) or until there is no more accelerator pedal free travel	
	Inspection	
6	Check full throttle and closed throttle positions	

REMOVING AND INSTALLING THROTTLE CONTROL CABLE - AR30.10-P-3400GI

ENGINE 612.963 in MODEL 163.113

ENGINE 628.963 in MODEL 163.128

ENGINE 112.942 in MODEL 163.154

ENGINE 112.970 in MODEL 163.157

ENGINE 113.942 in MODEL 163.172

ENGINE 113.981 in MODEL 163.174

ENGINE 113.965 in MODEL 163.175

10 Fixed lever
24 Accelerator pedal
24/1 Expanding wedge pin
30/4 Plastic clip
32 Control cable
35 Retracting spring
Arrow control cable holder

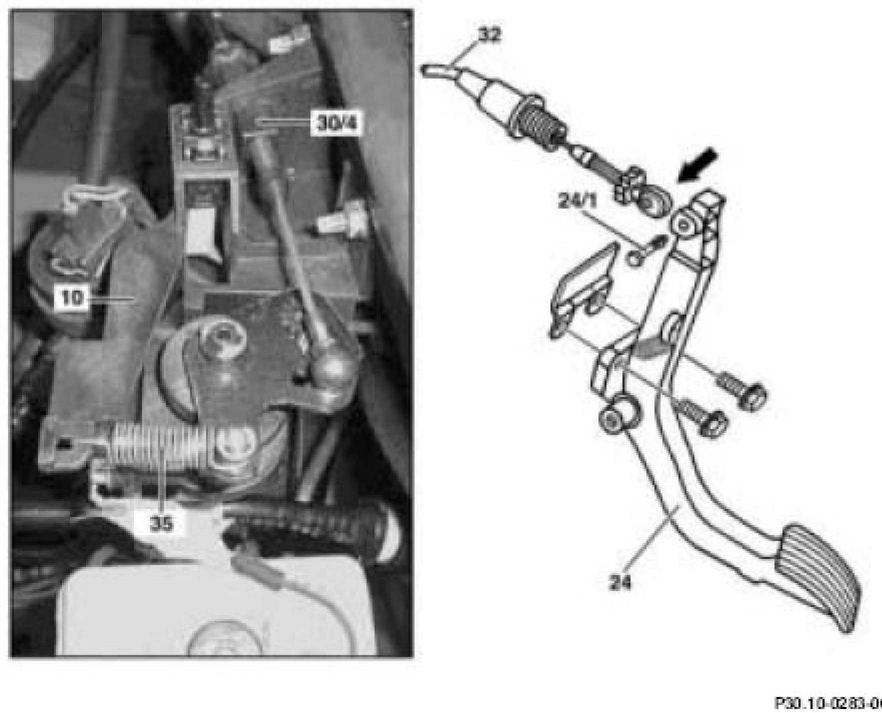


Fig. 19: Identifying Throttle Control Components - Shown On Engine 112.942 In Model 163.154

	Remove, Install		
1.1	Remove fender liner in right front fender	USA Only on vehicles with right-hand drive.	**AR88.10-P-1300GH**
2	Detach control cable (32) at ball head		
3	Push plastic clip (30/4) together and pull out of fixed lever (10) together with control cable (32)		
4	Remove cover below instrument panel (left)		**AR68.10-P-1500GH**
5	Unclip control cable holder (arrow) from accelerator pedal (24)	USA **Installation:** Expanding wedge pin (24/1) must securely latch.	

6	Push control cable (32) from vehicle interior towards the outside	USA Do not push rubber grommet out of splash wall.	
7	Remove entire control cable (32) from engine compartment		
8	Install in the reverse order		
9	Check throttle control, adjust	Engine 112.942/970, 113.942/965/981 ? Automatic transmission	**AR30.10-P-1010GJ**
		Engine 612.963: ? Manual/automatic transmission	AR30.10-P-1010GH
		Engine 628.963: ? Automatic transmission	AR30.10-P-1010GH

REMOVING AND INSTALLING ACCELERATOR PEDAL - AR30.12-P-1321GH

ENGINE 111.977 in MODEL 163.136

ENGINE 112.942 in MODEL 163.154

ENGINE 112.970 in MODEL 163.157

ENGINE 113.981 in MODEL 163.174

24 Accelerator pedal
24/1 Expanding wedge pin
24/4 Retracting spring of accelerator pedal
30 Control cable
34 Firewall pivot point
34/2 Bolts
34/3 Locking plate

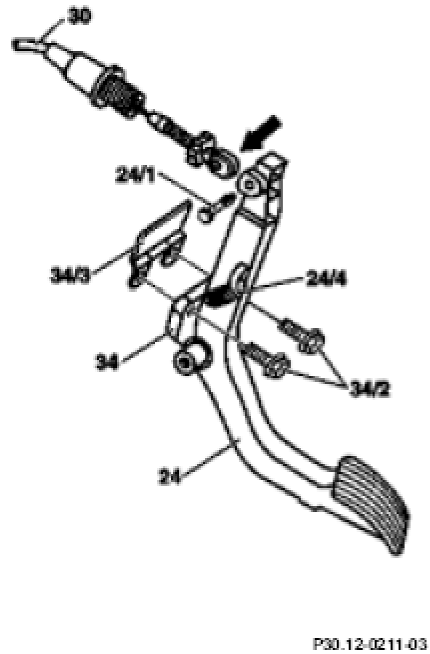


Fig. 20: Identifying Accelerator Pedal Components

	Remove, Install	
1	Detach control cable (30) at accelerator pedal (24) (arrow)	USA Pull out expanding wedge bolt (24/1) in order to do this.
2	Unscrew screws (34/2) from accelerator pedal (24)	
3	Remove accelerator pedal (24)	
4	Install in the reverse order	

REMOVE/INSTALL ELECTRONIC ACCELERATOR ACTUATOR WITH FLAP CONNECTION - AR30.20-P-1262A

MODEL 129, 163, 170, 171, 202, 203, 208, 209, 210, 215, 220, 230, 463 (except, 215.376 /378 /379, 220.176 /876 /178 /878 /179, 230.476 /477 /479)

Mass air flow sensor removed

Shown on engine 112 in model 210

1/2	Crankcase ventilation line
8/1	Bolts
8/2	O-ring
19	Intake manifold
M16/6	Throttle valve actuator
Arrow:	Plug connection

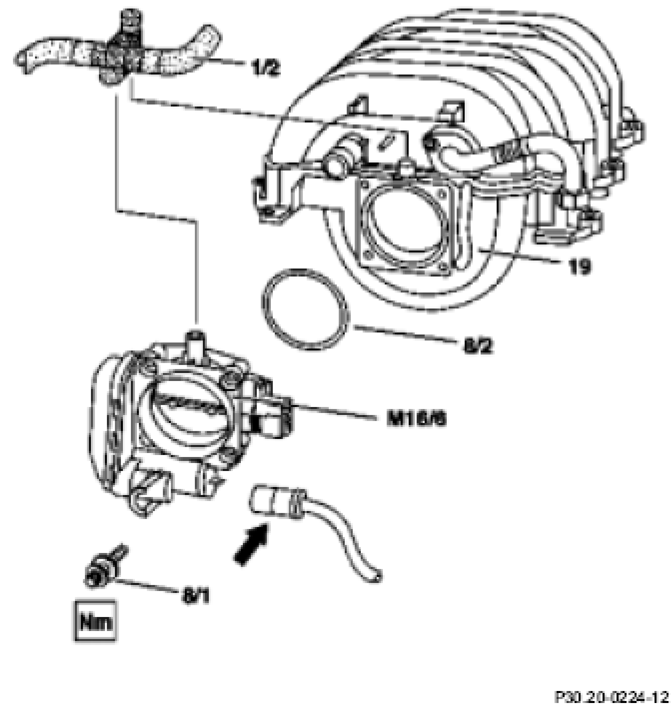


Fig. 21: Identifying Electronic Accelerator Actuator With Flap Connection

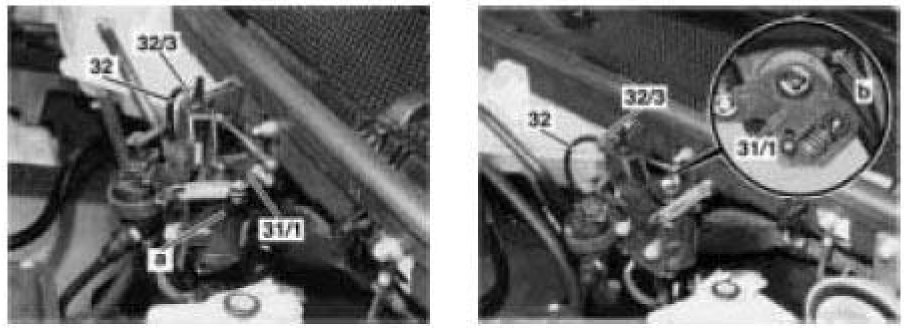
	Remove/install	
1	Detach crankcase vent line (1/2) from intake manifold (19)	
2	Disconnect electrical connector (arrow)	USA Pull catch backwards.
3	Remove bolts (8/1) and throttle valve actuator (M16/6)	USA **Installation:** Replace O-ring (8/2).
4	Install in the reverse order	

MAINTENANCE

LUBRICATE JOINTS OF ENGINE CONTROL SYSTEM, CHECK JOINTS FOR FREEDOM OF MOVEMENT AND PROPER SEATING - AP30.10-P-3022GH

ENGINE 112.942 /970, 113.942 /965 /981, 612.963, 628.963 in MODEL 163

31/1	Relay lever
32	Control cable
32/3	Adjusting bolt
a	Closed throttle stop
b	Full load stop



P30.10-0278-01 P30.10-0279-01

Fig. 22: Identifying Engine Control System Lubricate Joints

	Inspect		
1	Oil joint areas of throttle control, inspect for ease of operation and wear	USA Engine oil conforming to Specifications for Operating Fluids sheet 226.0-228.3 (**all except** Nm) and 236.6/7/9 (Nm)	

THROTTLE CONTROL - CHECK CONTROL CABLE FOR SMOOTH OPERATION - AP30.10-P-3024GH

ENGINE 612.963 in MODEL 163.113

ENGINE 628.963 in MODEL 163.128

ENGINE 111.977 in MODEL 163.136

ENGINE 112.942 in MODEL 163.154

ENGINE 112.970 in MODEL 163.157

ENGINE 113.942 in MODEL 163.172

ENGINE 113.981 in MODEL 163.174

ENGINE 113.965 in MODEL 163.175

	Inspect		
1	Slowly depress accelerator with your foot as far as the stop and release again	USA Pay attention to freedom of movement. If any jolting is noticeable: ? Replace accelerator control cable	
Nm	Remove/install throttle control cable	Model 163.136 with Engine 111.977 USA Model 163.113 with Engine 612.963, Model 163.128 with Engine 628.963,	AR30.10-P-3400GA

		Model 163.154 with Engine 112.942, Model 163.157 with Engine 112.970, Model 163.172 with Engine 113.942, Model 163.174 with Engine 113.981, Model 163.175 with Engine 113.965	**AR30.10-P-3400GI**